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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/816,055

03/31/2004

Shuxue Quan

80398P578

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8791

7590

01/24/2008

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EXAMINER

DANIELS, ANTHONY J

ART UNIT

PAPER NUMBER

2622

MAIL DATE

DELIVERY MODE

01/24/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/816,055	Applicant(s) QUAN, SHUXUE	
	Examiner Anthony J. Daniels	Art Unit 2622	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 13-19, 21-29 and 31-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-19, 21-29 and 31-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. The amendment, filed 11/9/2007, has been made of record. Claims 1-11,13-19,21-29 and 31-34 are pending in the application.
2. The amendment to claim 6 has overcome the examiner's objection.

Response to Arguments

1. Applicant's arguments regarding the independent claims and the Tani reference have been fully considered but they are not persuasive.

Applicant argues, "...because [Tani's] infrared-cut filter only transmits luminance values, the filter only transmits one imaging channel (luminance data). Because Tani's infrared-cut filter only transmits one imaging channel, and not at least two imaging channels as claimed, Tani-1 cannot be properly interpreted as teaching or suggesting this claimed element." The examiner respectfully disagrees with this assertion. Throughout the specification, applicant equates channel with color. The examiner has asserted in the previous office action that the IR cut filter would transmit all visible wavelengths. Thus, at least red and blue (two imaging channels) would be transmitted and sensed. Also, the examiner agrees that a luminance signal is produced from the sensor "15", but the luminance signal is composed of at least the red and blue imaging channels. It seems applicant is trying to impress having individual pixels sensing certain colors on the sensor (i.e. Bayer pattern) as the definition of an imaging channel. The examiner does not

assert that Tani's sensor "15" shows this but does submit that the claim does not require such a specific definition.

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

2. Applicant's arguments with respect to the Noguchi reference and the independent claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 13 recites the limitation "first imaging sensor means" in line 6. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1,3-5,7 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Tani (US # 5,379,069) – first interpretation.

As to claim 1, Tani teaches a digital imaging system (Figure 1) comprising: a first imaging sensor (Figure 1, CCD “15”); a second imaging sensor (Figure 1, CCD “14”), the second imaging sensor coupled to the first imaging sensor (Col. 2, Lines 24-27); a first filter coupled to the first imaging sensor (Figure 2B, complementary color filter “52”), wherein the first filter transmits light at a first set of wavelengths, the first set of wavelengths corresponding to at least two imaging channels (Figure 2B, cyan, magenta, yellow and green), and wherein the first imaging sensor senses the light transmitted through the first filter (Col. 2, Lines 31-35); and a second filter coupled to the second imaging sensor (Figure 2A, infrared cut filter “51”), wherein the second filter transmits the light at a second set of wavelengths, the second set of wavelengths corresponding to at least two imaging channels (Figure 2A; *{The IR cut filter filters all visible light wavelengths; thus, at least red and blue would be filtered.}*) offset from the imaging of the first set of wavelengths (*Red and Blue offset from cyan, magenta, yellow and green.*), and wherein the second imaging sensor senses the light transmitted through the second filter (Col. 2, Lines 31-35).

As to claim 3, Tani teaches the digital imaging system of claim 1, wherein the first imaging sensor is a charge coupled device (CCD) or a complementary metal-oxide semiconductor (Col. 2, Lines 21-24).

As to claim 4, Tani teaches the digital imaging system of claim 1, wherein the second imaging sensor is a charge coupled device (CCD) or a complementary metal-oxide semiconductor (Col. 2, Lines 21-24).

As to claim 5, Tani teaches the digital imaging system of claim 1, wherein the first filter is a trichromatic filter (Figure 2B, cyan, magenta and yellow).

As to claim 7, Tani teaches the digital imaging system of claim 1, wherein the first filter provides for three imaging channels (Figure 2B, cyan, magenta and yellow).

As to claim 8, Tani teaches the digital imaging system of claim 1, wherein the first filter provides for four imaging channels (Figure 2B, cyan, magenta, yellow and green).

2. Claims 1,6 and 9-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Tani (US # 5,379,069) – second interpretation.

As to claim 1, Tani teaches a digital imaging system (Figure 1) comprising: a first imaging sensor (Figure 1, CCD “14”); a second imaging sensor (Figure 1, CCD “15”), the second imaging sensor coupled to the first imaging sensor (Col. 2, Lines 24-27); a first filter coupled to the first imaging sensor (Figure 2A, infrared cut filter “51”), wherein the first filter transmits light at a first set of wavelengths, the first set of wavelengths corresponding to the at least two imaging channels (Figure 2A; *{The IR cut filter filters all visible light wavelengths; thus, at least red and blue would be filtered.}*), and wherein the first imaging sensor senses the

light transmitted through the first filter (Col. 2, Lines 31-35); and a second filter coupled to the second imaging sensor (Figure 2B, complementary color filter "52"), wherein the second filter transmits the light at a second set of wavelengths, the second set of wavelengths corresponding to at least two imaging channels (Figure 2B, cyan, magenta, yellow and green) offset from the first set of wavelengths (*Red and Blue offset from cyan, magenta, yellow and green.*), and wherein the second imaging sensor senses the light transmitted through the second filter (Col. 2, Lines 31-35).

As to claim 6, Tani teaches the digital imaging system of claim 1, wherein the second filter is a trichromatic filter (Figure 2B, cyan, magenta and yellow).

As to claim 9, Tani teaches the digital imaging system of claim 1, wherein the second filter provides for three imaging channels (Figure 2B, cyan, magenta and yellow).

As to claim 10, Tani teaches the digital imaging system of claim 1, wherein the second filter provides for four imaging channels (Figure 2B, cyan, magenta, yellow and green).

As to claim 11, Tani teaches the digital imaging system of claim 1, wherein the second filter provides for two imaging channels (Figure 2B, cyan and green).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1,2,13-19,21,25-29 and 31 are rejected under 35 U.S.C. 102(e) as being unpatentable over Noguchi (US # 6,885,394).

As to claim 1, Noguchi teaches a digital imaging system (Figure 4) comprising: an imaging sensor (Figure 2, "26"; Col. 7, Lines 26-33); a first filter coupled to the imaging sensor, wherein the first filter transmits light at a first set of wavelengths, the first set of wavelengths corresponding to at least two imaging channels (Figure 2, filter plate "22"; wavelengths 1-4; Figure 3), and wherein the imaging sensor senses the light transmitted through the first filter (Col. 6, Lines 58-66); and a second filter coupled to the imaging sensor, wherein the second filter transmits the light at a second set of wavelengths, the second set of wavelengths corresponding to at least two imaging channels (Figure 2, filter plate "22"; wavelengths 5-8; Figure 3) offset from the imaging of the first set of wavelengths (Figure 3), and wherein the imaging sensor senses the light transmitted through the second filter (Col. 6, Lines 58-66).

What Noguchi fails to teach is having two sensors, which are coupled to each other, sensing the light from the 1-4 and 5-8 wavelength regions, respectively. In Figure 2, Noguchi shows a color wheel with all eight wavelengths provided before the image sensor. The examiner takes **Official Notice** that the concept of replacing a color wheel with an image sensor having a color filter array is well known and expected in the art. Complementary color filters (4 colors) are an example of such. One of ordinary skill in the art would have been motivated to replace the color wheel of Noguchi with two color filters transmitting wavelengths 1-4 and 5-8, respectively for two image sensors.

In support of these assertions, the examiner submits an article by Karim Nice and Gerald Jay Gurevich. In the article, a more economical and practical way to record multiple colors for an

image through the use of Bayer filter patterns is taught. Further, Nice and Gurevich disclose that it is possible to get enough information to make very accurate guesses about the color information at the locations of the image sensor. These accurate guesses are made through interpolation (see attached article). The examiner also submits that such an alteration of Noguchi would result in a quicker arrival at the values of each wavelengths; thus, making the Noguchi apparatus more efficient.

As to claim 2, Noguchi teaches the digital imaging system of claim 1 further comprising: a processor to calculate a surface reflectance of an object based on the first set of wavelengths and the second set of wavelengths (Col. 6, Line 58 – Col. 7, Line 25).

As to claim 13, Noguchi teaches a digital imaging apparatus comprising (Figure 2): a means for capturing colorimetric information (Figure 2, “26”; Col. 7, Lines 26-33); a first means for filtering coupled with the sensor means (Figure 2, filter plate “22”), wherein the first means for filtering to transmit light at a first set of wavelengths and the first set of wavelengths corresponds to at least two imaging channels (Figure 2, filter plate “22”; wavelengths 1-4; Figure 3), and wherein the means for capturing colorimetric information senses the light transmitted through the first means for filtering (Col. 6, Lines 58-66); and a second means for filtering coupled with the second imaging sensor means (Figure 2, filter plate “22”), wherein the second means for filtering to transmit the light at a second set of wavelengths, the second set of wavelengths corresponds to at least two imaging channels offset from the imaging channels of the first set of wavelengths (Figure 2, filter plate “22”; wavelengths 5-8; Figure 3), and wherein the means for capturing colorimetric information senses the light transmitted through the second means for filtering (Col. 6, Lines 58-66).

What Noguchi fails to teach is having two sensors, which are coupled to each other, sensing the light from the 1-4 and 5-8 wavelength regions, respectively. In Figure 2, Noguchi shows a color wheel with all eight wavelengths provided before the image sensor. The examiner takes **Official Notice** that the concept of replacing a color wheel with an image sensor having a color filter array is well known and expected in the art. Complementary color filters (4 colors) are an example of such. One of ordinary skill in the art would have been motivated to replace the color wheel of Noguchi with two color filters transmitting wavelengths 1-4 and 5-8, respectively for two image sensors.

In support of these assertions, the examiner submits an article by Karim Nice and Gerald Jay Gurevich. In the article, a more economical and practical way to record multiple colors for an image through the use of Bayer filter patterns is taught. Further, Nice and Gurevich disclose that it is possible to get enough information to make very accurate guesses about the color information at the locations of the image sensor. These accurate guesses are made through interpolation (see attached article). The examiner also submits that such an alteration of Noguchi would result in a quicker arrival at the values of each wavelengths; thus, making the Noguchi apparatus more efficient.

As to claim 14, Noguchi teaches the digital imaging apparatus of claim 13 further comprising: a means for processing to calculate a surface reflectance of an object based on the first set of wavelengths and the second set of wavelengths (Col. 6, Line 58 – Col. 7, Line 25), the means for processing coupled with the first means for capturing colorimetric information and the second means for capturing colorimetric information (Figure 4).

As to claim 15, Noguchi teaches a machine-readable medium having instructions to cause a machine to perform a method, the method comprising: receiving a first set of wavelengths of light at a sensor (Figure 2, "26"; Col. 7, Lines 26-33) via a first filter (Figure 2, filter plate "22"), the first set of wavelengths corresponding to at least two imaging channels (Figure 2, filter plate "22"; wavelengths 1-4; Figure 3); receiving a second set of wavelengths of the light at the sensor via a second filter (Figure 2, filter plate "22"), the second set of wavelengths corresponding to at least two imaging channels offset from the imaging channels of the first set of wavelengths (Figure 2, filter plate "22"; wavelengths 5-8; Figure 3); and processing the first set of wavelengths and the second set of wavelengths to calculate a surface reflectance of an object (Col. 7, Lines 1-25).

What Noguchi fails to teach is having two sensors, which are coupled to each other, sensing the light from the 1-4 and 5-8 wavelength regions, respectively. In Figure 2, Noguchi shows a color wheel with all eight wavelengths provided before the image sensor. The examiner takes **Official Notice** that the concept of replacing a color wheel with an image sensor having a color filter array is well known and expected in the art. Complementary color filters (4 colors) are an example of such. One of ordinary skill in the art would have been motivated to replace the color wheel of Noguchi with two color filters transmitting wavelengths 1-4 and 5-8, respectively for two image sensors.

In support of these assertions, the examiner submits an article by Karim Nice and Gerald Jay Gurevich. In the article, a more economical and practical way to record multiple colors for an image through the use of Bayer filter patterns is taught. Further, Nice and Gurevich disclose that it is possible to get enough information to make very accurate guesses about the color

information at the locations of the image sensor. These accurate guesses are made through interpolation (see attached article). The examiner also submits that such an alteration of Noguchi would result in a quicker arrival at the values of each wavelengths; thus, making the Noguchi apparatus more efficient.

As to claim **16**, Noguchi teaches the machine-readable medium of claim 15, wherein the first set of wavelengths provides three imaging channels (Figure 2, wavelengths 1-3).

As to claim **17**, Noguchi teaches the machine-readable medium of claim 15, wherein the first set of wavelengths provides four imaging channels (Figure 2, wavelengths 1-4).

As to claim **18**, Noguchi teaches the machine-readable medium of claim 15, wherein the second set of wavelengths provides three imaging channels (Figure 2, wavelengths 5-7).

As to claim **19**, Noguchi teaches the machine-readable medium of claim 15, wherein the second set of wavelengths provides four imaging channels (Figure 2, wavelengths 5-8).

As to claim **21**, Noguchi teaches the machine-readable medium of claim 15, wherein the second set of wavelengths provides two imaging channels (Figure 2, wavelengths 5 and 6).

As to claims **25-29** and **31**, claims 25-29 and 31 are method claims corresponding to the apparatus claims 15-19 and 21, respectively. Therefore, claims 25-29 and 31 are analyzed and rejected as previously discussed with respect to claims 15-19 and 21, respectively.

2. Claims 22,24,32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (US # 6,885,394) in view of Vilaseca et al. (attached NPL).

As to claims **22** and **24**, Noguchi teaches the machine-readable medium of claim 15. The claim differs from Noguchi in that it further requires that the calculation of the surface reflectance include performing principal component analysis and Wiener estimation.

In the same field of endeavor, Vilaseca teaches an estimation of spectral reflectance wherein Wiener inverse estimation and principal component analysis is used to calculate spectral reflectance (p. 1789, 2nd paragraph). In light of the teaching of Vilaseca, it would have been obvious to include these estimation algorithms in the calculation of spectral reflectance in the system of Noguchi, because an artisan of ordinary skill in the art would recognize that this would allow for an efficient way to achieve reproduced color.

As to claims **32** and **34**, claims 32 and 34 are method claims corresponding to the apparatus claims 22 and 24, respectively. Therefore, claims 32 and 34 are analyzed and rejected as previously discussed with respect to claims 22 and 24, respectively.

2. Claims 23 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi (US # 6,885,394) in view of Arai (US # 5,864,834).

As to claim **23**, Noguchi teaches the machine-readable medium of claim 15. The claim differs from Noguchi in that it further requires that the calculation of the surface reflectance include performing independent component analysis.

In the same field of endeavor, Arai teaches the use of independent analysis of illuminants to achieve spectral reflectance (Col. 2, Line 7-15). In light of the teaching of Arai, it would have been obvious to one of ordinary skill in the art to include this algorithm in the calculation of spectral reflectance in the system of Noguchi, because one of ordinary skill in the art would

recognize that this would ensure that the reproduced color matches the color of the original image (see Arai, Col. 2, Lines 7-15)

As to claims 33, claims 33 is a method claim corresponding to the apparatus claim 23. Therefore, claim 33 is analyzed and rejected as previously discussed with respect to claim 23.

Conclusion

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Daniels whose telephone number is (571) 272-7362. The examiner can normally be reached on 8:00 A.M. - 5:30 P.M..

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lin Ye can be reached on (571) 272-7372. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AD
1/21/2008



LIN YE
SUPERVISORY PATENT EXAMINER